Teacher: **Shelly Beers**	Course: **STEAM 8**	Grade Level(s): **8**
Quarter Course	Quarter Course broken down by days (45-day quarter) Topic(s): **Problem-Solving; Makey Makey; Sphero; Balsa Wood Bridges; Breadboards/Raspberry Pi**	
Content/Big Ideas	• Students will begin to understand the importance of problem-solving strategies and teamwork within the Makerspace setting. (BreakoutEDU – 1 day) • Students will learn how to complete a circuit. (MakeyMakey – 7 days) • Students will learn Scratch code to program Sphero robots to accomplish various tasks. (Sphero – 9 days) • Students will research different bridge designs and complete a pros/cons analysis on different bridge designs. (Balsa Wood Bridges – 3 days) • Students will design and build a balsa wood bridge using set parameters. (Balsa Wood Bridges – 15 days) • Students will learn python language and circuitry using breadboards and Raspberry Pi. (Breadboards/Raspberry Pi – 8 days) [Welcome/Course expectations – 1 day; Course wrap-up – 1 day]	
Essential Questions	• How is problem-solving used in your everyday life? And why is it important to learn problem-solving skills? (all projects) • Why is understanding how circuits work important to our lives? (MakeyMakey) • How does Scratch coding relate to JavaScript coding and which type of coding is more easily used in this class? (Sphero) • How does bridge design affect the structural integrity of bridges? (Balsa Wood Bridge) • How does learning python language and breadboard circuitry open the possibilities for coding and electronics? (Breadboarding/Raspberry Pi)	
Concepts	• Students will develop an appreciation for learning problem-solving strategies to use in all aspects of their lives. • Students will learn how to complete simple circuits. (MakeyMakey) • Students will learn Scratch coding. (Sphero) • Students will use mathematical computations (angles and velocity) in order to program Sphero to successfully complete a student-made maze using automation. (Sphero) • Students will utilize the Engineering Design Process through balsa wood bridge design and prototyping. (Balsa Wood Bridge) • Students will learn how breadboards and building circuits with Raspberry Pi and python language can create endless programming possibilities. (Breadboards/Raspberry Pi)	

Competencies	• Problem-solving techniques need to become part of students' normal thought process in all aspects of their lives. • Circuits are the backbone of all electronics used. • The study of technology uses many of the same ideas and skills as other subjects. • Various relationships exist between technology and other fields of study. • Knowledge gained from other fields of study has a direct effect on the development of technological products and systems. • The Engineering Design Process is a core outline of how new products are developed through research, planning, prototyping, testing, and redesigning. • Programming through python language requires precision and learning new technical vocabulary.
Standards/Benchmarks	ISTE 1a – Articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes (Sphero, Balsa Wood Bridges). ISTE 3a – Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits (BreakoutEDU). ISTE 4a – Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems (BreakoutEDU, Balsa Wood Bridges). ISTE 4b – Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks (BreakoutEDU, Sphero, Balsa Wood Bridges). ISTE 4c – Develop, test and refine prototypes as part of a cyclical design process (Balsa Wood Bridges). ISTE 4d – Exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems (BreakoutEDU, Sphero, Balsa Wood Bridges). ISTE 5a – Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions (MakeyMakey, Sphero). ISTE 5d – Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions (Sphero). ISTE 6a – Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication (Balsa Wood Bridges). ISTE 6c – Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations (MakeyMakey).

Activities & Assessments	• Students will work in groups and use BreakoutEDU to solve numerous problems in order to unlock the BreakoutEDU box. • Students will choose various objects that may or may not conduct electrical current to complete circuits. (MakeyMakey) • Students will create an "Operation"-type game using MakeyMakeys to demonstrate their knowledge of circuitry. (MakeyMakey) • Students will use mathematical computations (angles and velocity) in order to program Sphero to successfully complete a student-made maze using automation. (Sphero) • Students will research three different kinds of bridges and complete a pros/cons analysis on structural design. (Balsa Wood Bridges) • Students will build a primary prototype using set parameters for building. Students will test the primary design, calculate bridge efficiency based off the weight of the bridge and how much weight the bridge can hold. Students will then re-evaluate good and bad aspects of bridge design then redesign and rebuild to test efficiency. (Balsa Wood Bridges) • Students will complete numerous challenges with building a circuit with breadboards and programming with python language on a Raspberry Pi. (Breadboards/Raspberry Pi)